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What is Claimed:

1. A method for modifying ground water chemistry in an aquifer comprising adding an oxygen-containing gas into the aquifer wherein the addition is by diffusion and modifying the ground chemistry by gas diffusion of the oxygen-containing gas into the aquifer.

- 2. The method of claim 1, wherein the oxygen-containing gas addition is made through aeration wells around a production well.
- 3. The method of claim 1, where the aeration wells are equipped with a well screen, and diffusers for adding the oxygen-containing gas.
- 4. The method of claim 1, wherein the aeration wells are located at a distance from the production well which allows desirable reactions at a desirable distance "upstream" from the production well and from the aeration wells so that a manipulation of the aquifer does not have deleterious effects on a hydraulic capacity of the aquifer.
- 5. The method of claim 1, wherein the aeration wells are located at such a distance from the production well that desirable reactions do not decrease the hydraulic capacity at the production well.
- 6. The method of claim 1, wherein the aeration wells are located in a manner to achieve desirable reactions in such a location and direction from the production well so that the required water quality is achieved.
- 7. The method of claim 2, comprising using fine bubble diffusers in the aeration wells to bring about desirable reactions.
- 8. The method of anyone of claims 1-8, wherein there is a reduction of the level of iron, arsenic and/or manganese in the ground water of the aquifer.
- 9. A method according to any one of claims 1-8 comprising sequestering or coprecipitating an amount of a target substance such as iron, arsenic or manganese from the ground water.
- 10. A system for delivering an oxygen-containing gas to ground water comprising aeration wells around at least one production well wherein the aeration well comprises a means for delivery of the oxygen-containing gas to an aquifer in a finely diffused form.
- 11. The system of claim 11, wherein the oxygen-containing gas is injected by fine pore diffusers.
- 12. The system of anyone of claims 10-11 further comprising a controller to monitor gas delivery and to control gas delivery.

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13. A method for modifying ground water chemistry in an aquifer comprising adding an oxygen-containing gas and Fe²⁺ into the aquifer wherein the gas delivery is by diffusion.

- 14. The method of claim 13, wherein Fe²⁺ addition is made through delivery wells separate from aeration wells used for gas addition.
- 15. The method of claim 13, wherein Fe²⁺ addition is made through the aeration wells.